Before the
Federal Communications Commission
Washington, D.C. 20554

In the matter of	)	
	)	
Amendment of Parts 2, 25 of the Commission's	)	
Rules to Permit Operation of NGSO FSS Systems	)	ET Docket No. 98-206
Co-Frequency with GSO and Terrestrial Systems	)	
in the Ku-Band	)	
	)	

SECOND MEMORANDUM OPINION AND ORDER

Adopted: February 3, 2003 **Released: February 11, 2003**

By the Commission:

I. INTRODUCTION & EXECUTIVE SUMMARY

1. In this Second Memorandum Opinion and Order ("Second MO&O"), we address the Petitions for Reconsideration from Skybridge L.L.C. ("Skybridge"); and Hughes Communications, Inc., Hughes Communications Galaxy, Inc. and Hughes Network Systems, a division of Hughes Electronics Corporation ("Hughes") filed in response to the *First Report and Order and Further Notice of Proposed Rule Making* ("*First R&O*") in ET Docket No. 98-206.[1] This proceeding addresses, *inter alia*, a request by Skybridge to allow non-geostationary orbit ("NGSO") fixed satellite services ("FSS") to share various frequencies in the Ku-Band with existing geostationary orbit ("GSO") satellite services and terrestrial services.[2] Our action herein addresses aspects of the Skybridge Reconsideration Petition relating to NGSO FSS sharing with terrestrial services and Federal Government operations, as well as the Hughes Reconsideration Petition relating to our radio frequency ("RF") safety rules requiring warning labels and recommending professional installation for NGSO FSS subscriber antennas. We defer consideration of remaining reconsideration issues regarding GSO FSS and NGSO FSS sharing raised by Skybridge to a future order.

2. As discussed below, we deny Hughes' Reconsideration Petition and grant in part and deny in part Skybridge's Reconsideration Petition Specifically, we make the following determinations in response to petitioners' requests for reconsideration:

[1] *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range,* FCC 00-418, *Report and Order and Further Notice of Proposed Rule Making,* ET Docket No. 98-206, 16 FCC Rcd 4096 (rel. Dec. 8, 2000) [hereinafter *First R&O*]; Petition for Reconsideration of SkyBridge L.L.C., ET Docket No. 98-206 (Mar. 19, 2001) [hereinafter Skybridge Reconsideration Petition]; Joint Petition for Partial Reconsideration (Mar. 19, 2001) [hereinafter Hughes Reconsideration Petition].

[2] Skybridge Petition for Rule Making (filed July 3, 1997) [hereinafter Skybridge Petition]. Ku-Band is generally defined as frequencies in the 12-18 GHz range.

- We grant Skybridge's request and amend our Rules to allow, under certain conditions, NGSO FSS Earth-to-space ("uplink") operations in the 13.15-13.2125 GHz portion of the 12.75-13.25 GHz band. In making this change we conclude that NGSO FSS can implement measures to protect incumbent broadcast auxiliary service ("BAS") and cable television relay service ("CARS") mobile pickup operations from harmful interference.[3]

- We grant Skybridge's request and state that power flux density ("PFD") limits for NGSO FSS in the 10.7-11.7 GHz band are sufficient to protect services in the band without the need for individual coordination. This ensures incumbent services are protected against harmful interference without creating an unnecessary burden on NGSO FSS licensees.

- We grant Skybridge's request and amend our Rules to clarify the definition of NGSO FSS earth station gateways to limit use only for NGSO FSS backbone support.

- We grant Skybridge's request and adopt the International Telecommunications Union's ("ITU") effective isotropically radiated power ("EIRP") limit on federal radiolocation operations in the 13.75-14.0 GHz band, and permit NGSO FSS operations to claim protection from these radiolocation operations.

- We deny Skybridge's request, maintain the EIRP density limit to protect against interference to the National Aeronautics and Space Administration ("NASA") tracking data and relay satellite system ("TDRSS") operations across the 10 megahertz of the 13.77-13.78 GHz band, and deny the request to restrict this protection to only 6 megahertz.

- We deny Skybridge's request to require NGSO FSS licensees and radio astronomy service ("RAS") entities to use the protection levels and calculation methods in the ITU's Article 29.[4] We will maintain the requirement in footnote US355 that NGSO FSS licensees in the 10.7-11.7 GHz band coordinate with RAS entities to reach "mutually acceptable agreements."[5] This flexible approach will allow the use of Article 29 procedures or any other procedure deemed appropriate by the interested parties.

- We deny Hughes's Petition to revisit language in the First R&O recommending professional installation of two-way NGSO FSS antennas. We continue to find that the language is neither overly broad nor unnecessary, and is harmonious with the language of other NGSO FSS orders.[6]

II. BACKGROUND

3. On July 3, 1997, Skybridge requested modification of the Commission's Rules to permit NGSO FSS systems to share portions of the Ku-Band with various incumbent operations.[7] On March 6, 1998, Northpoint Technology, Ltd. ("Northpoint") filed a Petition for Rulemaking to allow the operation

[3] TV pickup stations are land mobile stations used for the transmission of material from scenes of events occurring at points removed from the TV broadcast studio to the TV broadcast station. *See* 47 C.F.R. §§ 74.601(a), 78.5(d) (defining the BAS and CARS pickup services); *see also* Comments of Society of Broadcast Engineers, Inc., ET Docket No. 98-206, January 12, 2000, at 3 (describing field applications of BAS pickup operations in the 2 GHz, 7 GHz, and 13 GHz bands).

[4] International Telecommunications Union Radio Regulations, Volume 1, Ch. 1, Article 29.

[5] *See* 47 C.F.R. § 2.106 US355.

[6] *See First R&O* ¶ 252. The Commission will conduct a rule making proceeding to review and, where necessary, harmonize the Commission's regulations concerning transceiver equipment approval for radiofrequency.

[7] *See* Skybridge Petition.

of a terrestrial one-way, point-to-multipoint fixed service in the 12.2-12.7 GHz band.[8] On November 24, 1998, the Commission responded to the Skybridge and Northpoint Petitions for Rulemaking adopting the subject *Notice* to address their requests.[9]

4. In the *Notice*, the Commission proposed to allow on a co-primary basis NGSO FSS gateway downlink operations in the 10.7-11.7 GHz band; NGSO FSS gateway uplink operations in the 12.75-13.25 GHz, 13.8-14.0 GHz, and 14.4-14.5 GHz bands; NGSO FSS service downlinks in the 11.7-12.7 GHz band; and NGSO FSS service uplinks in the 14.0-14.5 GHz band.[10] In addition, the Commission proposed to apply the PFD limits adopted at the 1997 World Radiocommunication Conference ("WRC-97"), existing coordination procedures and other techniques to facilitate sharing between NGSO operations and terrestrial services.[11] It also sought comment on the WRC-97 provisional equivalent PFD ("EPFD") limits[12] for NGSO sharing with GSO operations and requested thorough analysis concerning the adequacy of these limits. The Commission proposed to not allow NGSO FSS gateway uplink operations in the 13.75-13.8 GHz and 17.3-17.8 GHz bands due to potential interference with Federal Government operations in the 13.75-13.8 GHz band, and a potential sharing conflict with broadcast satellite services ("BSS") and Federal Government radiolocation services in the 17.3-17.8 GHz band.[13] The Commission sought comment on these and alternative approaches.

5. In the *First R&O*, the Commission decided to allow NGSO FSS operations in the bands proposed in the *Notice*. The Commission declined to permit NGSO FSS gateway uplink operations in the 13.15-13.2125 GHz band in order to protect BAS/CARS pickup operations, while permitting NGSO FSS gateway uplinks in the 13.75-13.8 GHz band subject to constraints to ensure sharing with Federal Government operations. The Commission also adopted NGSO FSS PFD limits to allow sharing with terrestrial operations, EPFD limits to allow sharing with other satellite operations, as well as other regulatory requirements to ensure spectrum sharing in these bands (*e.g.*, coordination requirements, operational definitions and other service rules). The Commission found that the adopted technical criteria would ensure NGSO FSS operations could share spectrum with incumbent services without causing harmful interference or unduly constraining future growth of incumbent services, while allowing flexibility in implementing NGSO FSS systems. In the *First R&O,* the Commission also determined that Northpoint's proposed terrestrial fixed service could share the 12.2-12.7 GHz band with NGSO FSS and BSS operations. The Commission designated these operations as a new multipoint video and data distribution service ("MVDDS") and proposed technical and service rules for MVDDS in the *Further Notice* portion of the adopted item.

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[8] Northpoint Petition for Rule Making (filed March 6, 1998) [hereinafter Northpoint Petition].

[9] *See Notice* ¶¶ 4-13.

[10] *Id*. ¶ 14. NGSO FSS applicants generally proposed systems with two types of links: service links and gateway links. Service links are used to communicate between the satellite and individual customers and the gateway links are used as backbone support for the system to route customer traffic to other networks. Gateway earth stations would be limited in number and essentially serve as feeder links or as a hub for the NGSO FSS system.

[11] *Id*.

[12] EPFD is the sum of the power levels of all possible interfering transmissions from all satellites in a particular NGSO constellation into a particular GSO earth station receiver. *Id.* ¶ 4

[13] *Id*. ¶ 14. Skybridge accepts both the Commission and the ITU's conclusions regarding sharing possibilities in the 17.3-17.8 GHz band, but asks the Commission to maintain an "open mind." *See* Skybridge Reconsideration Petition at 49. We urge the petitioner to properly observe our rules regarding the filing of petitions for reconsideration in the future. *See* 47 C.F.R. § 1.429(c) (requiring petitions for reconsideration to state with particularity how Commission action should be changed).

6. Several parties petitioned for reconsideration of various portions of the *First R&O.*[14] Reconsideration issues concerning MVDDS use of the 12.2-12.7 GHz band were addressed in the *Memorandum Opinion and Order and Second Report and Order* ("*First MO&O and Second R&O*").[15] Here we address reconsideration requests to the *First R&O* raised by Hughes and Skybridge concerning spectrum sharing with terrestrial operations (other than those already addressed for the 12.2-12.7 GHz band), Federal Government operations, and the RAS; the definition for NGSO FSS gateway earth stations; and RF safety requirements for two-way NGSO FSS terminals. Two replies to the Skybridge Reconsideration Petition were received,[16] and no replies to the Hughes Reconsideration Petition were received. We defer the remaining issues on NGSO and GSO sharing raised in petitions for reconsideration to a Third Memorandum Opinion and Order.[17]

III. DISCUSSION

A. NGSO FSS and BAS/CARS Sharing of 13.15-13.2125 GHz Band

7. In the *First R&O*, the Commission allowed NGSO FSS gateway uplinks in the 12.75-13.25 GHz band, but excluded them from the 13.15-13.2125 GHz portion of the band to protect BAS/CARS mobile pickup operations. The exclusion of NGSO FSS operations extended the scope of the existing BAS/CARS mobile pickup operations' exclusive use at the 13.15-13.2125 GHz band, within a 50 km radius of the top-100 television markets, to include all 211 markets in the United States.[18] The Commission noted that BAS/CARS mobile pickup operations often receive flexible authorizations to operate nationwide on any available channel in that band to facilitate electronic news gathering ("ENG") operations which move to the scene of breaking news events. The Commission stated that such flexible nationwide mobile use would be difficult to coordinate with NGSO FSS uplink gateway operations and thus created a "carve-out" of four channels in the 12.75-13.25 GHz band at 13.15-13.2125 GHz exclusively for BAS/CARS mobile pickup uses. This action was also intended to encourage the congregation of mobile operations to these four channels to prevent interference from NGSO FSS uplinks.

8. Skybridge urges the Commission to reconsider the decision to exclude NGSO FSS operations from the 13.15-13.2125 GHz segment of 12.75-13.25 GHz band. Skybridge claims this exclusion will seriously impair NGSO FSS operations in this and neighboring bands. Although the amount of spectrum affected by the decision is small, Skybridge argues the impact of the exclusion is considerable because the exclusion divides the available uplink spectrum, thus complicating

[14] Petition for Reconsideration of SkyTower, Inc., ET Docket No. 98-206 (Mar. 12, 2001); Petition for Reconsideration of The Boeing Company, ET Docket No. 98-206 (Mar. 19, 2001); Petition for Reconsideration of DirecTV, Inc., ET Docket No. 98-206 (Mar. 19, 2001); Petition for Reconsideration of EchoStar Satellite Corporation, ET Docket No. 98-206 (Mar. 19, 2001); Hughes Reconsideration Petition; Petition for Reconsideration of PanAmSat Corporation, ET Docket No. 98-206 (Mar. 19, 2001); Petition for Reconsideration of Satellite Broadcasting and Communications Association, ET Docket No. 98-206 (Mar. 19, 2001); Skybridge Reconsideration Petition.

[15] *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range,* FCC 02-116, *Memorandum Opinion and Second Report and Order,* ET Docket No. 98-206, (rel. May 23, 2002) [hereinafter *First MO&O and Second R&O*].

[16] Reply Comments of the Boeing Company, April 9, 2001; Opposition to Petitions for Reconsideration of Skybridge L.L.C., April 24, 2001.

[17] The Third Memorandum Opinion and Order will address reconsideration requests regarding the technical implementations of various GSO and NGSO FSS sharing regimes.

[18] *See First R&O* ¶ 126.

channelization.[19] Skybridge argues that this division of the band will require separate transponders for the band below 13.15 GHz and above 13.2125 GHz, and the implementation of additional radio frequency filtering to suppress out of band emissions that otherwise would not be needed. Moreover, Skybridge explains that the satellites in question are used all over the world and may serve the U.S. only a small portion of the time. Nevertheless, compatibility with the U.S. exclusion will require significant changes to the specifications of these satellites and earth stations, modifications to the frequency plans, and significantly impact spectrum usage internationally.[20] Skybridge also contends that use of NGSO FSS allocated service downlink spectrum at 11.7-12.7 GHz band is constrained by this exclusion because the gateway uplink spectrum at 12.75-13.25 GHz corresponds with service downlinks at 11.7-12.7 GHz. Skybridge argues that having the NGSO FSS uplink spectrum narrower than its accompanying downlink spectrum further limits bandwidth channelization flexibility and exacerbates the burden of the exclusion.

9. Skybridge argues that our goal of protecting BAS/CARS operations can be accomplished without resorting to an outright exclusion of NGSO FSS from any segment of the 12.75-13.25 GHz band, because sharing between NGSO FSS and BAS/CARS operations is feasible.[21] Skybridge contends that there is no technical analysis in the record that supports a conclusion that sharing is not possible between NGSO FSS and BAS/CARS mobile pickup operations in the 13.15-13.2125 GHz band, and argues that the general assertions of sharing infeasibility by the Society of Broadcast Engineers are insufficient to justify such a conclusion.[22] Skybridge contends that the current use of the 13.15-13.2125 GHz band by GSO FSS entities demonstrates that sharing between satellite and BAS/CARS mobile pickup operations is technically feasible and supported by our Rules.[23] Skybridge relies on the lack of any limitation on FSS operations in Section 74.602 of the Rules[24] or domestic footnote NG53 to the Table of Frequency Allocations,[25] and the nine or more GSO FSS authorizations recognized in the *First R&O,* in opposing SBE's assertion that as a matter of law BAS/CARS pickup operations enjoy an exclusive right against FSS operations in the 13.15-13.2125 GHz band.[26] Skybridge argues that permitting GSO FSS but not NGSO FSS operations in this band is unjustified.[27]

10. Boeing supports Skybridge's request that the 13.15-13.2125 GHz band be opened to NGSO FSS.[28] Boeing similarly states that sharing between NGSO FSS gateway earth stations and terrestrial services is feasible and contends that our gateway earth station definition and siting requirements will sufficiently limit the proliferation of gateway earth stations and any detrimental impact on BAS/CARS incumbent and future use. Skybridge and Boeing's arguments on this issue were unopposed.

11. ***Decision***. On reconsideration, we modify our rules to permit NGSO FSS uplink operations in the 13.15-13.2125 GHz band outside a 50 km radius of the top 100 television markets. We

[19] Skybridge Reconsideration Petition at 18.

[20] *See Id.* at 19 & n.46.

[21] *Id.* at 20.

[22] See *Id.* at 20, citing the Comments and Replies of the Society of Broadcast Engineers on March 2, 1999, March 29, 1999, and January 12, 2000 discussing sharing possibilities.

[23] Skybridge Reconsideration Petition at 21-22.

[24] *See* 47 C.F.R. § 74.602.

[25] *See* 47 C.F.R. § 2.106 NG53.

[26] Skybridge Reconsideration Petition at 21.

[27] *Id*.

[28] Reply Comments of the Boeing Company at 16 (Apr. 9, 2001).

find that NGSO FSS gateway uplink operations can share this band with fixed and mobile operations outside of the major television markets, where BAS/CARS mobile pickup operations are least prevalent. We agree with the petitioner that the outright exclusion of NGSO FSS operations from the 13.15-13.2125 GHz segment of the 12.75-13.25 GHz band could unnecessarily impair NGSO FSS use of the 12.75-13.25 GHz band, as well as other bands allocated for NGSO FSS.[29] Further, we find that this "carve-out" of the 13.15-13.2125 GHz as adopted could limit the use by NGSO FSS links in the 13.2125-13.25 GHz portion due to satellite transponder design and the need for additional radio frequency filtering.

12. We find that NGSO FSS gateway uplinks can operate in the 13.15-13.2125 GHz band subject to these reasonable sharing conditions. We modify our Rules to only disallow NGSO FSS use of the 13.15-13.2125 GHz band within a 50 km radius of the top 100 television markets identified in Section 76.51 of our Rules.[30] In reconsidering the exclusion of NGSO FSS from the 13.15-13.2125 GHz band, we note SBE's January 12, 2000 comments requesting an outright exclusion of NGSO FSS gateway links in the 13.15-13.2125 GHz portion in the top 100 television markets. We believe it is important to restrict NGSO FSS gateway operations in these areas on this portion of the spectrum to ensure BAS/CARS mobile pickup deployment flexibility where their use is most prevalent.

13. Further, we modify our rules to permit NGSO FSS gateway operations in the 13.15-13.2125 GHz on a co-primary basis outside the 50 km radius of the top 100 television markets identified in Section 76.51.[31] This will allow NGSO FSS use of the 13.15-13.2125 GHz band throughout a significant portion of the United States and will address the petitioner's concerns regarding the effective use of NGSO FSS allocated spectrum. In the areas where the 13.15-13.2125 GHz band will be used, we find that our NGSO FSS siting and coordination policies subject to a future proceeding will be sufficient to protect the less intense BAS/CARS mobile use outside of the top 100 television markets. Further, this decision is consistent with the discussion of the *First R&O*, as well as Skybridge's own petition, identifying geographic separation as an important part of ensuring that NGSO FSS operations do not hinder BAS/CARS mobile and temporary fixed BAS/CARS use of this band.[32]

14. To further protect BAS/CARS mobile pickup deployment flexibility, we adopt an EIRP limit of 3.2 dBW at zero degree elevation from an NGSO FSS gateway earth station transmitting in the 13.15-13.2125 GHz portion. We find it is appropriate to adopt this additional EIRP limit towards the horizon for the 13.15-13.2125 GHz band due to the need to minimize the size of the area around a NGSO FSS gateway earth station where mobile BAS/CARS mobile pickup operations may have to coordinate use.[33] This limit is based upon a 20 dB reduction in the maximum sidelobe EIRP of an NGSO FSS gateway earth station, when the earth station main beam is pointing at 5 degrees. This EIRP limit relies on calculations based on information contained in the Skybridge L.L.C. Application to Launch and Operate a Global Network of Low Earth Orbit Communications Satellites Providing Broadband Services

[29] While a significant amount of spectrum was made available for NGSO FSS use in this proceeding, the "carve-out" at 13.15-13.2125 GHz could prevent the effective use of other portions of their allocated spectrum.

[30] *See* Appendix A. We note that our Rules originally afforded BAS/CARS mobile pickup operations exclusive use, relative to fixed services, of the four channels in the 13.15-13.2125 GHz band within the top 100 markets, but the *First R&O* extended BAS/CARS mobile pickup operations' exclusive use of the band to all 211 television markets enumerated in our Rules. This decision reverses the extension of exclusive use of the band by BAS/CARS mobile stations beyond the top 100 television markets. *See First R&O* ¶ 126 (discussing extension of BAS/CARS exclusive use in 47 C.F.R. § 74.602 n.2 from 50 km radius of top 100 markets to all U.S. markets).

[31] *See* Appendix A.

[32] *See First R&O* ¶ 125; Skybridge Reconsideration Petition at 22 (identifying siting away from key urban markets as support for feasibility of sharing possibilities in the 13.15-13.2125 GHz band).

[33] BAS/CARS mobile pickup operations may need to be deployed anywhere in the United States with limited notice to cover news events.

in the Fixed Satellite Service, File No. 48-SAT-P/LA-97, dated February 28, 1997; and Comments of SBE to ET Docket No.98-142, dated September 21, 1998.

15. The record demonstrates this 20 dB reduction is achievable through standard attenuation measures such as berms or leveraging of natural shielding or it may already be achieved by systems that do not operate at low elevation angles.[34] This will reduce the required coordination distance from 150 kilometers to 15 kilometers, assuming worst case free space propagation loss along 0° elevation from the NGSO FSS gateway transmitter. We observe that the comments of Boeing discuss limiting the necessary separation distances between NGSO FSS gateway earth stations and BAS/CARS operations by limiting energy levels emitted near the horizon.[35] We further note that only Skybridge and Boeing filed requests for reconsideration of the "carve out" of the 13.15 GHz band and it appears from their filings that they anticipated limiting their EIRP towards the horizon as a means of sharing with BAS/CARS mobile operations. Therefore, we do not find that this additional limit that applies only to the 13.15-13.2125 GHz band is overly burdensome. This EIRP limit ensures that present and future mobile operations have deployment flexibility in the four channels of the 13.15-13.2125 GHz band, and are protected against interference from the broad diversity of implementations anticipated by NGSO FSS operations. Where system requirements necessitate use of the previously prohibited 13.15-13.2125 GHz band, NGSO FSS licensees are free to employ those methods most appropriate to satisfy each licensee's system requirements so long as they meet this lower elevation angle power limit.

16. Further we reiterate our decision in the *First R&O* that no gateway earth station authorizations shall be issued in this band until a proceeding has been completed addressing coordination between NGSO FSS and BAS/CARS mobile pickup operations in this band.[36] In the proceeding to follow, the Commission will address coordination concerns of both predictable and sporadic events, such as breaking news events. The Commission will seek comment on the complex sharing scenarios implicated by potentially high-elevation angle mobile pickups sharing with NGSO FSS uplink and downlink operations. The Commission will pay close attention to the current BAS/CARS licensing procedures and coordination practices that rely on informal consensual negotiations relying on a strong community of mutual interests. The Commission will consider what obligations both NGSO FSS gateway and mobile pickup operations should observe in order to ensure equitable band sharing and what coordination/sharing can occur without unnecessary burdens and regulatory oversight. We will also consider the kind of notification that will be necessary to inform BAS/CARS stations of new gateway earth stations including whether gateway earth station applications should be put on public notice. We find it is necessary to address the process in a proceeding to ensure that the various parties' interests are served and that mobile operations continue to have the flexibility needed to serve the public effectively. We are confident that our decisions here will complement the proposals in our future proceeding to ensure the protection of mobile pickup operations from harmful interference while avoiding an unnecessarily burdensome regulatory environment that would hinder the development of NGSO FSS systems.

17. In sum, we find that successful sharing between NSGO FSS and BAS/CARS operations can be accomplished due to the limited deployment of NGSO FSS gateway earth stations and the

[34] *See* Comments of Society of Broadcast Engineers, Inc., ET Docket No. 98-206, January 12, 2000, ¶ 7 (discussing the shielding properties of berms and other natural topographic conditions).

[35] *See* Boeing Reply Comments at 22 (April 14, 1999). Given the maximum EIRP and sidelobe levels described in Boeing's Comments, it appears that the Boeing system's gateway earth stations will meet the EIRP limit adopted for the 13.15 GHz band without any additional shielding. This is due in part to the minimum operational angle of 10 degrees.

[36] *See First R&O* at 128 ("Further, we will not license any NGSO FSS earth station in the 12.75-13.15 GHz and 13.2125-13.25 GHz bands until appropriate coordination rules are adopted.").

technical limits we are adopting to reduce the interference potential between these operations. As indicated in the *First R&O*, a limited number of GSO FSS earth stations have coordinated and have been authorized to use the 12.75-13.25 GHz band on a case-by-case basis.[37] We believe that similar coordination can be achieved for NGSO FSS gateway earth stations. As noted in the *First R&O*, Parts 74 and 78 of our Rules do not currently address coordination between BAS/CARS mobile pickup operations and satellite services.[38] We will soon initiate a proceeding to consider the development of such coordination rules both for this band and for sharing between BAS/CARS pickup operations and Mobile Satellite Service ("MSS") feeder links in the 7 GHz range.[39] As supported by the comments to the *Notice* and as discussed above, we will also adopt certain limitations on NGSO FSS use of the 13.15-13.2125 GHz portion in order to minimize the effect of NGSO FSS operations on BAS/CARS mobile pickup flexibility and deployment. We believe the approach discussed above will allow NGSO FSS uplink operations in the 13.15-13.2125 GHz band without unjustified constraints, while ensuring protection of current and future BAS/CARS mobile pickup operations.

B. PFD Limits at 10.7-11.7 GHz for Protection of FS Receivers

18. In the *First R&O*, the Commission decided to allow NGSO FSS gateway downlink operations in the 10.7-11.7 GHz band. To promote sharing, it adopted PFD limits for NGSO FSS operations.[40] These limits were supported by findings of the ITU Radiocommunication Sector ("ITU-R"),[41] adopted internationally through agreement at the 2000 World Radiocommunication Conference ("WRC-2000"),[42] and were generally supported by the record of this proceeding.[43] The studies supporting the limits and the Commission's independent analysis indicated that the PFD limits it adopted were adequate to protect the vast majority of terrestrial fixed service ("FS") operations in the 10.7-11.7 GHz band from NGSO FSS satellite transmissions. However, the Commission concluded that because individual NGSO FSS systems exhibit different operational characteristics (*e.g.*, different minimum angles of operation), each NGSO FSS licensee must determine whether incumbent FS operations with elevation angles more than 5 degrees above the horizon could be affected and must be responsible for ensuring their operations do not expose incumbent operations to harmful interference, including possible mainbeam-to-mainbeam alignments.[44] The Commission noted a particular concern that the PFD limits could expose incumbent public safety FS links to harmful interference and pose an unacceptable risk to public safety operations.[45] The Commission directed that such public safety FS links should be protected from even the rare likelihood of harmful interference. The Commission explained that, rather than

[37] *First R&O* at 50, n.270.

[38] *Id.* ¶¶ 125, 28 ("[S]ome form of geographic protection area will be developed for locating NGSO FSS gateway earth stations that should prevent NGSO FSS gateway earth stations from hindering mobile and temporary fixed BAS use of this band."). In the separate proceeding, we will address the Joint "Growth Zone" Proposal of FWCC and Skybridge, for "growth zone" siting restrictions and other coordination obligations and procedures between FSS, fixed and mobile services. *See* Letter from SkyBridge and FWCC to Magalie Roman Salas, Secretary, Federal Communications Commission at 3 (December 8, 1999) [hereinafter *Growth Zone Proposal*]

[39] *Amendment Of Parts 2, 25, and 97 Of The Commission's Rules With Regard To The Mobile Satellite Service Above 1 GHz*, ET Docket 98-142, *Report and Order*, FCC 02-23, 17 FCC Rcd 2658 (rel. Feb. 7, 2002); 47 C.F.R. § 25.201 (defining the mobile-satellite service).

[40] *See* 47 C.F.R. § 25.208; *see also First R&O* ¶ 39.

[41] *See* ITU-R Working Party 9A (WP 9A) and Joint Working Party 4-9S (JWP 4-9S).

[42] *See* WRC-2000 *Provisional Final Acts* at Article S21.

[43] *See First R&O* ¶¶ 35-37 (discussing comments).

[44] *See First R&O* ¶ 42; 47 C.F.R. §§ 25.203 & 101.103.

[45] *See First R&O* ¶ 42.

tightening the pfd limits to address the mainbeam-to-mainbeam interference situations, any protection can be accomplished on a case-by-case basis and several mitigation techniques were identified.[46]

19. Skybridge requests that we reconsider the decision to require NGSO FSS licensees to coordinate their satellite downlink signals with FS links operating at elevation angles greater than 5 degrees above the horizon in the 10.7-11.7 GHz band. Skybridge argues that this requirement is unnecessary and unworkable. Skybridge argues that the agreement of the ITU-R's technical study groups[47] that PFD limits were sufficient to protect FS operations, more than one year prior to their ultimate adoption at the WRC-2000, demonstrates that concerns for FS link protection were adequately considered and addressed by the adopted PFD limits.[48] Further, Skybridge argues that coordination is unworkable because every new NGSO FSS system would have to individually coordinate its downlink operations with each FS operation within the NGSO FSS service area. It states that such individual coordination would necessarily have to rely on a database containing detailed information about FS links' path length, elevation, azimuth, radio characteristics and sensitivity, and the terrain profile around the FS links. It further argues that, like the ITU-R which considered and resolved these FS protection concerns with PFD limits, the Commission should clarify that observance of PFD limits would satisfy our requirement for NGSO FSS downlinks to protect high-elevation angle FS links. No fixed service entity filed comments in response to Skybridge's request.

20. ***Decision.*** Typically in shared bands, our Rules require satellite downlink operations to meet PFD limits to protect terrestrial operations, and do not require coordination of the downlink signal with each individual terrestrial receiver operating in the subject bands.[49] We note that coordinating with terrestrial operations would be especially difficult for NGSO FSS downlinks because the satellite signals vary with both time and space.[50] We find that the weight of the record supports a factual finding that the adopted PFD limits are sufficient to protect all but the rarest deployments of FS operations in this band. On reconsideration, we agree with the international and domestic review that concludes the likelihood of interference would be *de minimis*. In the *First R&O,* the Commission stated that the adopted PFD limits were developed through agreements at WRC-2000, which were the result of ITU-R studies that considered a variety of deployment scenarios, including aggregate interference from GSO FSS satellites and multiple NGSO FSS systems.[51] We continue to find that the ITU studies justifying these PFD limits indicate that they are adequate to protect the vast majority of terrestrial fixed operations. In addition, as the Commission noted in the *First R&O,* the PFD limits are the same used for GSO FSS operations in this frequency band and have proven to be adequate.[52] We believe that the high degree of conservatism found in the ITU's model[53] concerning the satellite power, satellite pointing direction, and the FS orientation to

[46] *See First R&O* ¶ 41.

[47] Skybridge points to the conclusions of the ITU-R study groups WP 9A, JWP 4-9S, and JTG 4-9-11. *See* Skybridge Reconsideration Petition at 47.

[48] *Id*.

[49] *See generally* 47 C.F.R. §25.208.

[50] Unlike GSO FSS systems, NGSO FSS satellites are in constant motion across the sky in different arcs.

[51] *First R&O* ¶ 38.

[52] *Id.* ¶ 39.

[53] *See* ITU-R Study Groups, *Sharing Between Non-Geostationary Satellites in the FSS and the Fixed Service in the 10-12 GHz Frequency Range*, France, Doc 4-9S/67-E, *available at* http://www.itu.int/itudocr/itu-r/archives/rsg/1998-00/rjwp4-9/49524_ww7.doc. Specifically, we note that ITU's modeling is very conservative in that it assumed that all of the satellites in view were transmitting at the maximum power toward the fixed station. While the model employed a very conservative interference threshold for the fixed service receiver, it did not specifically address fixed service links with elevation angles greater than 5 degrees.

the worst case azimuth coupled together with the conservative protection criteria, will protect the majority of links.

21. Concerning the special case identified in the *First R&O,* wherein a high elevation angle fixed link might suffer from mainbeam–to-mainbeam interference, our review of the ITU analyses indicates that they may not have directly considered the higher elevation angle case.[54] Nevertheless, we find that such interference occurrences would be rare because the number of fixed stations is small and the antenna beamwidths for both the FSS and fixed service stations are narrow. Further, links with high elevation angles would typically have short path lengths and therefore, should benefit from more reliable communications. Given the typical reliability of short range links, the benefits of partial shielding that the fixed links may have, the limited duration and chances of occurrence of any interference events, and the conservative nature of the pfd limits, we conclude that the adopted PFD limits should be adequate to ensure the protection of these fixed links in all but the rarest cases. Further, we agree with the petitioner that the technical and logistic complexity of identifying and coordinating with these FS links on an individual basis would constitute an undue burden, when weighed against the disproportionate rarity of any possible interference. Therefore, we clarify that it was not our intent to require that individual coordination be performed, and, moreover, no rules were adopted codifying such a requirement.[55] However, it was our intention to protect all incumbent fixed links above 5° from harmful interference by subsequent NGSO FSS entrants, even if the NGSO FSS system meets the pfd limits. Accordingly, we will require that the NGSO FSS systems take steps to ensure that all existing fixed service links, particularly public safety links, with elevation angles above 5 degrees are protected from harmful interference. This is consistent with the co-primary status between NGSO FSS entrants and fixed service operations in this band. Given the diversity of NGSO FSS systems that may operate in this band, licensees should be given flexibility in ensuring that these fixed links are protected. For example, some NGSO FSS systems might only operate at higher elevation angles or operate with lower pfd levels and thus would not pose an interference threat or have difficulty meeting this requirement. Other systems with characteristics that may be more threatening may opt to model the potential impact of their system on high elevation angle fixed links to determine whether the pfd limits are adequate.

22. Therefore, on reconsideration, we clarify that our intent with regard to paragraph 42 of the *First R&O* was to state that NGSO FSS operators must ensure that existing high elevation angle links are protected and that the NGSO FSS operators must ensure that harmful interference to incumbent operations does not occur, even if the pfd levels are met. Further, consistent with the co-primary status of NGSO FSS downlink and fixed service operations in the 10.7-11.7 GHz band, we also clarify that our Rules protect "first-in" operations from harmful interference caused by subsequently deployed

[54] We specifically note that some ITU study groups specifically addressed analysis of a worst case with main-beam coupling where "probability to see a satellite passing the main-beam of the FS receiver antenna is the highest, given its latitude and pointing elevation." *See* ITU-R Doc 4-9S/67-E, *Sharing Between Non-Geostationary Satellites in the FSS and the Fixed Service in the 10-12 GHz Frequency Range*, France, *available at* http://www.itu.int/itudocr/itu-r/archives/rsg/1998-00/rjwp4-9/49524_ww7.doc. Although the ultimate ITU recommendation did not speak directly to the case of elevation angles, we find that the recommendation strongly implied consideration of such a case in stating that the "specified pfd limits are based on analyses that assumed every satellite in the constellation produced emissions at the maximum levels allowed by the pfd limits *for all angles of arrival*." *See* ITU-R Recommendation SF.1482, *Maximum Allowable Values Of PFD Produced At The Earth's Surface By NON-GSO Satellites In The FSS Operating In The 10.7-12.75 GHz Band* (emphasis added).

[55] Especially for the short path links in question, neither the Commission's own Universal Licensing System ("ULS") nor third-party databases record the variety of information with sufficient specificity and accuracy to effectively complete an analysis. We conclude that requiring coordination based on these limitations could be ultimately unproductive.

operations.[56] We believe that the PFD levels will adequately protect incumbent fixed service links from harmful interference due to new NGSO FSS downlink operations in this band, but should interference occur, the new entrant shall continue to be responsible for resolving the interference to an acceptable level. Future fixed service links should be designed to consider both NGSO FSS and GSO FSS systems in this band at the adopted PFD levels, and will not be permitted to claim protection from NGSO FSS operations that are in service at the time the FS station becomes operational. These provisions will ensure that: existing licensees, including any public safety users, are protected from new entrants into the band; and that future links are designed appropriately for the sharing environment.

C. Gateway Earth Station Definition

23. In the *First R&O*, the Commission adopted a functional definition for gateway earth stations that reflected a desire to permit deployment of NGSO FSS gateway earth stations in shared bands while protecting the continued use and growth of those bands by terrestrial operations.[57] The adopted definition, as set forth in Section 25.201 of the Rules, limits the use of these earth stations to interconnecting multiple non-collocated user earth stations operating in frequency bands other than designated gateway bands.[58] The gateway earth station definition also prohibits gateway earth stations from connecting to "private communication networks." The intent of this prohibition was to prevent gateway earth stations from being used to exclusively serve any individual customer network and thus prevent the proliferation of large numbers of gateway earth stations in certain bands.

24. Skybridge requests the Commission reconsider the gateway definition's restriction on connections to private communications networks.[59] Skybridge argues that the language of the definition it and the Fixed Wireless Communications Coalition ("FWCC")[60] advocated in their *Growth Zone Proposal,* should be adopted by the Commission. The proposed language of the Skybridge/FWCC definition would prohibit gateway earth stations from connecting to "customer-owned or customer-operated private distribution networks,"[61] but the language adopted by the Commission prohibited connection to "private communications networks" outright.[62] Skybridge argues that under the definition adopted by the Commission legitimate gateway traffic servicing private networks is prohibited, while under their definition the Commission's concern to prohibit the use of a gateway for the exclusive use of

[56] *See e.g.*, 47 C.F.R. §§ 25.203, 101.103.

[57] *First R&O* ¶ 30. 47 C.F.R. § 25.201 defines NGSO FSS gateway earth station as follows:

> Gateway earth station. A gateway earth station is an earth station complex consisting of multiple interconnecting earth station antennas supporting the communication routing and switching functions of a non-geostationary satellite orbit fixed-satellite service (NGSO FSS) system as a whole. A gateway earth station in the NGSO FSS: (1) does not originate or terminate radiocommunication traffic, but interconnects multiple non-collocated user earth stations operating in frequency bands other than designated gateway bands, through a satellite with other primary terrestrial networks, such as the public switched telephone network (PSTN) and/or Internet networks; (2) is prohibited from connecting directly with a private communication network; (3) may also be used for telemetry, tracking, and command transmissions for the same NGSO FSS system; (4) may include multiple antennas, each required to meet the antenna performance standard in Section 25.209(h), located within an area of one second latitude by one second longitude; and (5) is considered as a separate gateway earth station complex if it is out side of the area of one second latitude by one second longitude of (4) above, for the purposes of coordination with terrestrial services.

[58] *Id*.

[59] Skybridge Reconsideration Petition at 48.

[60] *See Growth Zone Proposal*, *supra* note 37, at 3.

[61] *Id.*

[62] 47 C.F.R. § 25.201.

a single customer is addressed without unnecessarily restricting the licensees' ability to provide satellite services to private networks.

25. ***Decision***. We reiterate that our intent in prohibiting connection to a "private communications network" was to prevent the proliferation of large numbers of gateway earth stations in certain bands. However, we agree with the petitioner that the gateway earth station definition should not limit connection to all private networks, *per se*, and we adopt changes to our Rules to allow gateway earth stations to connect to private networks. We also modify our Rules to prohibit gateway earth stations' exclusive use for the service of a single customer.[63] Gateway earth stations may route communications to and from customers, through the satellite, to the public switched telephone network, broadband networks and/or private networks. However, under the language proposed by Skybridge prohibiting connection to "customer-owned or customer-operated private distribution networks" NGSO FSS licensees might still operate a gateway earth station for the exclusive use of a single customer, which could lead to an undesirable proliferation of private NGSO FSS gateway earth stations in shared bands. We adopt language clarifying that licensees shall not use gateway earth stations for the exclusive use of any single customer. We believe this definition will allow gateway links to meet the intended needs of NGSO FSS licensees and will facilitate spectrum sharing between the gateway earth stations and terrestrial operations. Accordingly, the new gateway definition reads as follows:

> Gateway earth station. A gateway earth station is an earth station complex consisting of multiple interconnecting earth station antennas supporting the communication routing and switching functions of a non-geostationary satellite orbit fixed-satellite service (NGSO FSS) system as a whole. A gateway earth station in the NGSO FSS: (1) does not originate or terminate radiocommunication traffic, but interconnects multiple non-collocated user earth stations operating in frequency bands other than designated gateway bands, through a satellite with other primary terrestrial networks, such as the public switched telephone network (PSTN), and/or Internet networks; (2) shall not be for the exclusive use of any customer; (3) may also be used for telemetry, tracking, and command transmissions for the same NGSO FSS system; (4) may include multiple antennas, each required to meet the antenna performance standard in Section 25.209(h), located within an area of one second latitude by one second longitude; and (5) is considered as a separate gateway earth station complex if it is outside of the area of one second latitude by one second longitude of (4) above, for the purposes of coordination with terrestrial services.

D. Radiolocation Operations in the 13.75-14.0 GHz Band

26. In the *First R&O,* the Commission concluded that sharing between NGSO FSS and Federal Government radiolocation operations in the 13.75-14.0 GHz band was feasible despite reservations expressed by the Department of Defense ("DoD") and NTIA.[64] The Commission stated that NGSO FSS entities were aware of the presence of incumbent high-power radiolocation entities and could be expected to design their systems to compensate for potential interference concerns. To promote sharing with GSO FSS operations, our Rules limit the maximum EIRP of radiolocation operations in the direction of the GSO arc to 59 dBW averaged over one second. The ITU agreed at WRC-2000 to extend the 59 dBW EIRP limit on radiolocation operations from the GSO arc to all possible orbital locations, in order to protect NGSO FSS operations.[65] However, the Commission did not adopt the new ITU 59 dBW EIRP limitation over the entire sky and maintained this limit with respect to the GSO arc only.[66] The Commission stated that NGSO FSS operations would not be permitted to claim protection from

[63] *See* Appendix A.

[64] *See First R&O* ¶ 143.

[65] *See* Provisional Final Acts of WRC-2000, No. 5.502.

[66] *See First R&O* ¶ 143.

radiolocation operations.[67] Skybridge requests that the Commission reconsider its decision declining to extend protection to NGSO FSS operations from radiolocation operations in the 13.75-14.0 GHz Band.[68]

27. ***Decision***. In the *First R&O,* the Commission noted the important concerns of NTIA for national security if radiolocation operations were required to meet the new 59 dBW EIRP limit adopted at the WRC-2000.[69] Indeed, the 13.75-14.0 GHz band is used for ship borne radar systems that are critical to U.S. national defense. In their past fillings to the Commission, NTIA stated that operating requirements of radiolocation systems prevented modifications to comply with the proposed 59 dBW EIRP limit across the entire sky.[70] In NTIA's recent filling,[71] it indicates that radiolocation operations will now be able to observe the proposed 59 dBW EIRP limit without threat to the effectiveness of such operations. Accordingly, we grant Skybridge's request to modify our Rules, implementing a 59 dBW EIRP limit on radiolocation operations in the 13.75-14.0 GHz band with respect to all arcs in the sky, extending protection to both GSO and NGSO FSS operations.[72] Finally, we note that NTIA also states that ongoing developmental work on radiolocation systems operating in this band may determine that a higher EIRP limit at low elevation angles (e.g., at elevations angles of less than 2 degrees) is necessary. Based on the outcome of this work, NTIA may request that the Commission consider adding such a requirement to the rules.

E. NASA TDRSS Operations at 13.77-13.78 GHz

28. Prior to the *First R&O*, the Table of Frequency Allocations in Section 2.106 of the Rules contained international footnote 5.503, which limited FSS EIRP density to protect TDRSS operations to 71 dBW in a 6 megahertz band at 13.772-13.778 GHz.[73] WRC-2000 changed the EIRP density limit to 51 dBW per 6 megahertz in footnote 5.503 to protect TDRSS operations. In the *First R&O*, the Commission adopted this EIRP density level, but expanded the bandwidth of protection across 10 megahertz at 13.77-13.78 GHz[74] due to new requirements for the International Space Station.[75] This requirement was codified in our domestic footnote US357.[76]

29. Skybridge requests we reconsider our decision to expand the EIRP density limits in footnote US357 for all FSS earth stations across the 10 megahertz in the 13.77-13.78 GHz band to protect TDRSS systems.[77] Skybridge argues our decision does not comport with the agreements at WRC-2000, which only extended the EIRP limit across a 6 megahertz band. Skybridge argues further that the more

[67] *See Id.* ¶ 143.

[68] Skybridge Reconsideration Petition at 48-49.

[69] *See First R&O* ¶ 144.

[70] *See* Letter from William T. Hatch, Associate Administrator, Office of Spectrum Management, NTIA, to Dale Hatfield, Chief, Office of Engineering and Technology (October 20, 2000).

[71] *See* Letter from Fredrick R. Wentland, Office of Spectrum Management, NTIA, to Fred Thomas, FCC IRAC Liaison Representative (Sep. 20, 2002).

[72] *See* Appendix A.

[73] *See* 47 C.F.R. § 2.106; *see also First R&O* ¶ 135; Amendment of Parts 2, 25, and 90 of the Commission's Rules to Allocate the 13.75-14.0 GHz Band to the Fixed-Satellite Service*,* ET Docket No. 96-20, *Report and Order,* 11 FCC Rcd 11951 (1996)**.**

[74] *See First R&O* ¶ 145.

[75] *Id.* ¶ 145

[76] *See* 47 C.F.R. § 2.106 US357.

[77] Skybridge Reconsideration Petition at 48-49.

broad protection was not appropriately raised in the *Notice*, or debated in the record, and asserts that the technical basis for the decision is unclear.

30. ***Decision***. In the *Notice*, the Commission proposed to exclude NGSO FSS operations from the entire 50 megahertz at 13.75-13.8 GHz in order to protect TDRSS operations.[78] Nevertheless, it sought comment on how NGSO FSS operations could share this band with TDRSS operations.[79] Based on international agreements and additional study, it was determined at WRC-2000 and in this proceeding that NGSO FSS could share with TDRSS operations if coordination and EIRP density limits were applied.[80] Therefore, we are unconvinced by arguments that technical limits to protect TDRSS were not adequately raised in the *Notice*. The responses to questions in the *Notice* by NTIA provided the necessary record and analysis that spectrum sharing was possible between NGSO FSS and TDRSS in this federally shared band at 13.75-14.0 GHz subject to certain limits.[81]

31. In the *First R&O,* the Commission expanded the EIRP density limit across four more megahertz than the international requirements in 5.503 because the United States has an interest in protecting the additional TDRSS requirements of the space shuttle and International Space Station. Further, we have a completely separate requirement in US337 that requires FSS operations to coordinate on a case-by-case basis with TDRSS operations throughout the 13.75-13.8 GHz band, so specifying the necessary power limits across an additional four megahertz in this range is justified, and would otherwise be required in the coordination process. We, therefore, deny the petitioner's request.

F. Coordination with Radio Astronomy Facilities in the 10.7-11.7 GHz

32. In the *First R&O,* the Commission declined to adopt specific protection limits or calculation methodologies for sharing between NGSO FSS and RAS operations at 10.7 GHz, but noted the ITU's ongoing work in drafting new recommendations regarding NGSO FSS/RAS sharing. Instead, the Commission adopted a new footnote to the Table of Frequency Allocations, US355, which requires coordination by NGSO FSS with RAS facilities in the 10.7 GHz range to reach a "mutually acceptable agreement" prior to commencing activities.[82]

33. Skybridge urges that we adopt a change to our footnote US355 to require use of the protection levels and calculation methodologies specified in ITU Article 29 for sharing with RAS operations.[83] Skybridge did not provide justification for why ITU Article 29 methodologies should be mandated, nor why their concerns could not be accommodated under our current Rule.[84]

34. ***Decision***. The requirements we adopted in US355 simply require parties to coordinate to a "mutually acceptable agreement," thereby, permitting the parties to use any methodology or standard appropriate for their operations. Because of the wide variance in NGSO FSS implementations and RAS

[78] *Notice* ¶ 39.

[79] *Id.* ¶¶ 43, 50, & 51.

[80] *See First R&O* ¶¶ 145-46 (noting WRC-2000 changes to footnote S5.503 were intended to adequately protect TDRSS operations with 51 dBW/6 megahertz e.i.r.p. density limit, but did not account for increased bandwidth needed to support International Space Station operations).

[81] *Id.* ¶¶ 137-46 (discussing NGSO FSS and TDRSS sharing concerns).

[82] *See* 47 C.F.R. § 2.106 US355.

[83] International Telecommunications Union Radio Regulations, Volume 1, Ch. 1, Article 29.

[84] Again we direct the petitioner to our Rules governing requirements and procedures for the filing of petitions for reconsideration. *See* 47 C.F.R. § 1.429 (providing standards for admission of new facts in requesting reconsideration of Commission action); *see also supra* note 13.

sensitivities, it is appropriate that we allow licensees this flexibility in employing the most current and appropriate techniques for their operations. Therefore, we deny the request that US355 mandate the use of ITU Article 29 standards and procedures.

G. RF Safety Requirements for Two-Way NGSO FSS Antenna

35. The *First R&O* amended Table 1 in Section 1.1307(b) to require cautionary labeling on NGSO subscriber equipment regarding exposure of humans to RF emissions,[85] and adopted language recommending professional installation of two-way subscriber antennas to prevent siting antennas in such a way that persons could easily venture into the uplink beam.[86] Hughes petitions the Commission to retract the language in the *First R&O* recommending professional installation of antennas.[87] The language of the *First R&O* regarding professional installation merely recommends professional antenna installation, but does not require it by Commission rule. Moreover, contrary to petitioner's assertions,[88] we find that this language is neither overly broad nor unnecessary, and is harmonious with the language of other NGSO FSS orders.[89] We, therefore, dismiss the petitioner's request and leave in place our recommendation that these antennas be professionally installed. In addition, the Commission may examine RF safety concerns and NGSO FSS antenna rules on professional installation, labeling, interlocking measures, and instructional materials, in a future proceeding. The Commission's recommendations in the *First R&O* would not prejudice such a proceeding and need not be retracted.

IV. PROCEDURAL INFORMATION

A. Final Regulatory Flexibility Analysis

36. Final Regulatory Flexibility Analysis. The Final Regulatory Flexibility Analysis, required by Section 603 of the Regulatory Flexibility Act, as amended by the Contract with America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996), is contained in Appendix B.

B. Paperwork Reduction Analysis

37. The Second Memorandum Opinion and Order does not contain a proposed information collection.

C. Further Information

38. For further information concerning this Second Memorandum Opinion and Order, contact the Office of Engineering and Technology, James Miller, (202) 418-7351, TTY (202) 418-2989, email jjmiller@fcc.gov.

V. ORDERING CLAUSES

39. Accordingly, IT IS ORDERED that pursuant to the authority contained in Sections 4(i),

[85] 47 C.F.R. § 1.1307(b).

[86] *See First R&O* ¶ 251 ("*It is recommended* that two-way subscriber equipment, such as that used to connect to NGSO FSS systems, be installed by professional personnel, thereby minimizing the possibility that the antenna will be placed in a location that is likely to expose subscribers or other persons to the transmit signal at close proximity and for an extended period of time.") (emphasis added).

[87] Hughes Reconsideration Petition at 4.

[88] *Id.* at 3.

[89] *See Promotion of Competitive Networks in Local Telecommunications Markets*, 15 FCC Rcd 22983 ¶¶ 117-19 (2000).

7(a), 301, 303(c), 303(f), 303(g), 303(r), 308, and 309(j) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 157(a), 301, 303(c), 303(f), 303(g), 303(r), 308, and 309(j), this Second Memorandum Opinion and Order IS ADOPTED.

40. IT IS FURTHER ORDERED that, Parts 2, 25, 74, and 78 of the Commission's Rules ARE AMENDED as specified in Appendix A, effective 60 days after publication in the Federal Register. This action is taken pursuant to Sections 4(i), 303(c), 303(f), 303(g), 303(r), and 309(j) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(c), 303(f), 303(g), 303(r) and 309(j) .

41. IT IS FURTHER ORDERED that the petition for reconsideration of the *First R&O* filed by Skybridge IS GRANTED to the extent indicated in the Second Memorandum Opinion and Order, and IS OTHERWISE DENIED.

42. IT IS FURTHER ORDERED that the petition for reconsideration of the *First R&O* filed by Hughes IS DENIED.

43. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Second Memorandum Opinion and Order, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A: FINAL RULES

For the reasons discussed in the preamble, the FCC amends 47 C.F.R. Parts 2, 25, 74, and 78 as follows:

PART 2 -- FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation for part 2 continues to read as follows:

   AUTHORITY: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:

a. In the list of United States (US) Non-Government (NG) Footnotes, footnote NG53 is revised.

b. In the list of United States (US) Footnotes, footnote US356 is revised.

   The revisions read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

US356 In the band 13.75-14 GHz, an earth station in the fixed-satellite service shall have a minimum antenna diameter of 4.5 m and the e.i.r.p. of any emission should be at least 68 dBW and should not exceed 85 dBW. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation service shall not exceed 59 dBW. Receiving space stations in the fixed-satellite service shall not claim protection from radiolocation transmitting stations operating in accordance with the United States Table of Frequency Allocations. ITU Radio Regulation No. 5.43A does not apply.

* * * * *

Non-Federal Government (NG) Footnotes

* * * * *

NG53 The band 13.15-13.20 GHz is reserved for television pickup and CARS pickup stations inside a 50 km radius of the 100 television markets delineated in Section 76.51. Outside a 50 km radius of the 100 television markets delineated in Section 76.51, television pickup stations, CARS stations and NGSO FSS gateway earth stations shall operate on a primary co-equal basis. The band 13.20-13.2125 GHz is reserved for television pickup stations on a primary basis and CARS pickup stations on a secondary basis inside a 50 km radius of the 100 television markets delineated in Section 76.51. Outside a 50 km radius of the 100 markets delineated in Section 76.51, television pickup stations and NGSO FSS gateway earth stations shall operate on a co-primary basis, CARS stations shall operate on a secondary basis. Fixed television auxiliary stations licensed pursuant to applications accepted for filing before September 1, 1979, may continue operation on channels in the 13.15-13.25 GHz band, subject to periodic license renewals. NGSO FSS gateway uplink transmissions in the 13.15-13.2125 GHz segment shall be limited to a maximum EIRP of 3.2 dBW towards 0 degrees on the radio horizon. The above provisions shall not apply to GSO FSS operations in the 12.75-13.25 GHz band.

* * * * *

PART 25 – SATELLITE COMMUNICATIONS

3. The authority citation for Part 25 continues to read as follows:

AUTHORITY: 47 U.S.C. 701-744. Interprets or applies Sections 4, 301, 302, 303; 307, 309 and 332 of the Communications Act, as amended, 47 U.S.C. Sections 154, 301, 302, 303, 307, 309 and 332, unless otherwise noted.

4. Section 25.201 is amended as follows:

(a) New text is added to the preamble.
(b) Subsections (1), and (2) are revised.

The revisions read as follows:

§25.201 NGSO FSS gateway earth station.

* * * * *

Gateway earth station. A gateway earth station is an earth station complex consisting of multiple interconnecting earth station antennas supporting the communication routing and switching functions of a non-geostationary satellite orbit fixed-satellite service (NGSO FSS) system as a whole. A gateway earth station in the NGSO FSS: (1) does not originate or terminate radiocommunication traffic, but interconnects multiple non-collocated user earth stations operating in frequency bands other than designated gateway bands, through a satellite with other primary terrestrial networks, such as the public switched telephone network (PSTN), and/or Internet networks; (2) shall not be for the exclusive use of any customer; (3) may also be used for telemetry, tracking, and command transmissions for the same NGSO FSS system; (4) may include multiple antennas, each required to meet the antenna performance standard in Section 25.209(h), located within an area of one second latitude by one second longitude; and (5) is considered as a separate gateway earth station complex if it is outside of the area of one second latitude by one second longitude of (4) above, for the purposes of coordination with terrestrial services.

* * * * *

5. Section 25.202(a)(1) is revised to modify the table and add new footnote 14 and read as follows:

§ 25.202 Frequencies, frequency tolerance and emission limitations.

* * * * *

(a)(1) Frequency band. The following frequencies are available for use by the fixed-satellite service. Precise frequencies and bandwidths of emission shall be assigned on a case-by-case basis.

Space-to-Earth (GHz)	Earth-to-space (GHz)
3.7-4.2 [1]	5.925-6.425 [1]
10.7-10.95 [1, 12]	12.75-13.25 [1, 12, 14]
10.95-11.2 [1, 2, 12]	13.75-14 [4, 12]
11.2-11.45 [1, 12]	14-14.2 [5]
11.45-11.7 [1, 2, 12]	14.2-14.5
11.7-12.2 [3]	17.3-17.8 [9]
12.2-12.7 [13]	27.5-29.5 [1]
18.3-18.58 [1, 10]	29.5-30
18.58-18.8 [6, 10, 11]	48.2-50.2
18.8-19.3 [7, 10]	
19.3-19.7 [8, 10]	
19.7-20.2 [10]	
37.6-38.6	
40-41	

[1] This band is shared coequally with terrestrial radiocommunication services.
[2] Use of this band by geostationary satellite orbit satellite systems in the fixed-satellite service is limited to international systems; i.e., other than domestic systems.
[3] Fixed-satellite transponders may be used additionally for transmissions in the broadcasting-satellite service.
[4] This band is shared on an equal basis with the Government radiolocation service and grandfathered space stations in the Tracking and Data Relay Satellite System.
[5] In this band, stations in the radionavigation service shall operate on a secondary basis to the fixed-satellite service.
[6] The band 18.58-18.8 GHz is shared co-equally with existing terrestrial radiocommunication systems until June 8, 2010.
[7] The band 18.8-19.3 GHz is shared co-equally with terrestrial radiocommunication services, until June 8, 2010. After this date, the sub-band 19.26-19.3 GHz is shared co-equally with existing terrestrial radiocommunication systems.
[8] The use of the band 19.3-19.7 GHz by the fixed-satellite service (space-to-Earth) is limited to feeder links for the mobile-satellite service.
[9] The use of the band 17.3-17.8 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for broadcasting-satellite service, and the sub-band 17.7-17.8 GHz is shared co-equally with terrestrial fixed services.
[10] This band is shared co-equally with the Federal Government fixed-satellite service.
[11] The band 18.6-18.8 GHz is shared co-equally with the non-Federal Government and Federal Government Earth exploration-satellite (passive) and space research (passive) services.
[12] Use of this band by non-geostationary satellite orbit systems in the fixed-satellite service is limited to gateway earth station operations.
[13] Use of this band by the fixed-satellite service is limited to non-geostationary satellite orbit systems.
[14] Use of this band by NGSO FSS gateway earth station uplink operations is subject to the provisions of Section 2.106 NG53.

* * * * *

PART 74 – EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER PROGRAM DISTRIBUTION SERVICES

6. The authority citation for Part 74 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 303 307, 336(f), 336(h) and 554.

7. Footnote 2 of Section 74.602 is amended to read as follows:

§ 74.602 Frequency assignment.

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2. The band 13.15-13.20 GHz is reserved for television pickup and CARS pickup stations inside a 50 km radius of the 100 television markets delineated in Section 76.51. Outside a 50 km radius of the 100 television markets delineated in Section 76.51, television pickup stations, CARS stations and NGSO FSS gateway earth stations shall operate on a primary co-equal basis. The band 13.20-13.2125 GHz is reserved for television pickup stations on a primary basis and CARS pickup stations on a secondary basis inside a 50 km radius of the 100 television markets delineated in Section 76.51. Outside a 50 km radius of the 100 markets delineated in Section 76.51, television pickup stations and NGSO FSS gateway earth stations shall operate on a co-primary basis, CARS stations shall operate on a secondary basis. Fixed television auxiliary stations licensed pursuant to applications accepted for filing before September 1, 1979, may continue operation on channels in the 13.15-13.25 GHz band, subject to periodic license renewals. NGSO FSS gateway uplink transmissions in the 13.15-13.2125 GHz segment shall be limited to a maximum EIRP of 3.2 dBW towards 0 degrees on the radio horizon. The above provisions shall not apply to GSO FSS operations in the 12.75-13.25 GHz band.

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PART 78 – CABLE TELEVISION RELAY SERVICE

8. The authority for part 78 continues to read as follows:

Authority: Secs. 2, 3, 4, 301, 303, 307, 308, 309, 48 Stat., as amended, 1064, 1065, 1066, 1081, 1082, 1083, 1084, 1085; 47 U.S.C. 152, 153, 154, 301, 303, 307, 308, 309.

9. Sections 78.18(l) and 78.18(m) are revised to read as follows:

§ 78.18 Frequency assignments.

* * * * *

(l) The band 13.15-13.20 GHz is reserved for television pickup and CARS pickup stations inside a 50 km radius of the 100 television markets delineated in Section 76.51. Outside a 50 km radius of the 100 television markets delineated in Section 76.51, television pickup stations, CARS stations and NGSO FSS gateway earth stations shall operate on a primary co-equal basis. The band 13.20-13.2125 GHz is reserved for television pickup stations on a primary basis and CARS pickup stations on a secondary basis inside a 50 km radius of the 100 television markets delineated in Section 76.51. Outside a 50 km radius of the 100 markets delineated in Section 76.51, television pickup stations and NGSO FSS gateway earth stations shall operate on a co-primary basis, CARS stations shall operate on a secondary basis. Fixed television auxiliary stations licensed pursuant to applications accepted for filing before September 1, 1979,

may continue operation on channels in the 13.15-13.25 GHz band, subject to periodic license renewals. NGSO FSS gateway uplink transmissions in the 13.15-13.2125 GHz segment shall be limited to a maximum EIRP of 3.2 dBW towards 0 degrees on the radio horizon. The above provisions shall not apply to GSO FSS operations in the 12.75-13.25 GHz band.

* * * * *

(m) CARS stations may be authorized for use of the band from 13.20 to 13.25 GHz on a secondary basis to Television Broadcast Auxiliary Stations. CARS stations are also secondary to NGSO FSS gateway earth station uplink operations. Any CARS application seeking authorization for use of the 13.20 to 13.25 GHz band must demonstrate that the applicant has exhausted all spectrum available to it in the 12.70 to 13.20 GHz band. Applications for use of this band must specify whether the channels are 6 MHz, 12.5 MHz, or 25 MHz wide and give the upper and lower boundaries and the polarization for each channel.

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APPENDIX B: SUPPLEMENTARY FINAL REGULATORY FLEXIBILITY ANALYSIS

As required by the Regulatory Flexibility Act (RFA),[90] an Initial Regulatory Flexibility Analysis ("IRFA") was incorporated in the *Notice of Proposed Rule Making* ("*Notice*") in ET Docket No. 98-206.[91] The Commission sought written public comment on the proposals in the *Notice*, including comment on the IRFA. A Final Regulatory Flexibility Analysis ("FRFA") conforming to the RFA[92] was incorporated into the *Report and Order and Further Notice of Proposed Rule Making ("First R&O"),* ET Docket No. 98-206. This Supplementary FRFA ("SFRFA") is included to address certain modifications to the rules adopted in the *First R&O*.

A. Need for, and Objectives of, the Second Memorandum Opinion and Order

In this Second MO&O, we address the Petitions for Reconsideration filed by Skybridge and Hughes in response to the *First R&O* in ET Docket No. 98-206. This Second MO&O addresses a request by Skybridge to allow NGSO FSS to share various frequencies in the Ku-Band with existing GSO satellite services and terrestrial services. Our action herein addresses aspects of the Skybridge Reconsideration Petition relating to NGSO FSS sharing with terrestrial services and Federal Government operations, as well as the Hughes Reconsideration Petition which relates only to our RF safety Rules requiring warning labels and recommending professional installation for NGSO FSS subscriber antennas. We defer consideration of remaining reconsideration issues regarding GSO FSS and NGSO FSS sharing raised by the Skybridge to a future order. We grant Skybridge's petition in part and deny it in part, and deny Hughes' petition. This SFRFA addresses the potential impact of granting the Skybridge's requests.

These new satellite and terrestrial operations can increase competition and provide new advanced services to the public. Specifically, NGSO FSS systems can provide new high-speed data services and offer additional competition to other satellite services, and terrestrial wireless and wireline services. There is, however, extensive use of the requested frequency bands in the United States and these incumbent operations provide important and valuable services to the public that we must protect. By this action, we provide for the introduction of new advanced services to the public, while permitting incumbent services to operate without harmful interference.

B. Summary of Significant Issues Raised by Public Comments In Response to the IRFA

No comments were submitted in response to the IRFA.

C. Description and Estimate of the Number of Small Entities To Which Rules Will Apply

The RFA generally defines the term "small entity " as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[93] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[94] A

[90] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 *et. seq.*, has been amended by the Contract With America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

[91] *See Notice of Proposed Rule Making*, ET Docket No. 98-206, 14 FCC Rcd. 1131, 1194 (1998).

[92] *See* 5 U.S.C. § 604.

[93] *Id*. § 601(6).

[94] *See Id.* § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more (continued....)

small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration ("SBA").[95] A small organization is generally "any not-for-profit enterprise which is independently owned and operated and is not dominant in its field."[96]

Regarding incumbent cable television operations in the 12.75-13.25 GHz band, the SBA has developed a definition of small entities for cable and other program distribution services, which includes all such companies generating $12.5 million or less in revenue annually. This definition includes cable systems operators, closed circuit television services, DBS services, multipoint distribution systems, satellite master antenna systems and subscription television services. According to the Census Bureau, there were 1,788 total cable and other program distribution services and 1,423 had less than $12.5 million in revenue.

The Communications Act also contains a definition of a small cable system operator, which is "a cable operator that, directly or through an affiliate, serves in the aggregate fewer than 1 percent of all subscribers in the United States and is not affiliated with any entity or entities whose gross annual revenues in the aggregate exceed $250,000,000." The Commission has determined that there are 61,700,000 subscribers in the United States. Therefore, we found that an operator serving fewer than 617,000 subscribers shall be deemed a small operator, if its annual revenues, when combined with the total annual revenues of all of its affiliates, do not exceed $250 million in the aggregate. Based on available data, we find that the number of cable operators serving 617,000 subscribers or less totals 1,450. We did not request nor did we collect information concerning whether cable system operators are affiliated with entities whose gross annual revenues exceed $250,000,000, and thus are unable at this time to estimate with greater precision the number of cable system operators that would qualify as small cable operators under the definition in the Communications Act.

Regarding incumbent GSO FSS satellite use and the proposed NGSO FSS use in these requested bands, the Commission has not developed a definition of small entities applicable to geostationary or non-geostationary orbit fixed-satellite service applicants or licensees. Therefore, the applicable definition of small entity is the definition under the Small Business Administration (SBA) Rules applicable to Communications Services, Not Elsewhere Classified. This definition provides that a small entity is one with $11.0 million or less in annual receipts.[97] According to Census Bureau data, there are 848 firms that fall under the category of Communications Services, Not Elsewhere Classified, which could potentially fall into the geostationary or non-geostationary orbit fixed-satellite service category. Of those, approximately 775 reported annual receipts of $11 million or less and qualify as small entities.[98] Generally, these NGSO and GSO FSS systems cost several millions of dollars to construct and operate. Therefore the NGSO and GSO FSS companies, or their parent companies, rarely qualify under this definition as a small entity.

Regarding Auxiliary, Special Broadcast and other program distribution services in the Ku-band. This service involves a variety of transmitters, generally used to relay broadcast programming to the public (through translator and booster stations) or within the program distribution chain (from a remote news-gathering unit back to the station). The Commission has not developed a definition of small entities specific to broadcast

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definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." *Id.* § 601(3).

[95] *See* Small Business Act, 15 U.S.C. § 632 (1996).

[96] *See* 5 U.S.C. § 601(4).

[97] *See* 13 C.F.R. § 121.201, NAICs code 51320.

[98] U.S. Bureau of Census, U.S. Department of Commerce, 1992 Census of Transportation, Communications, Utilities, UC92-S-1, Subject Series, Establishment and Firm Size, Table 2D, Employment Size of Firms: 1992, (issued May 1995).

auxiliary licensees. The U.S. Small Business Administration (SBA) has developed small business size standards, as follows: 1) For TV BAS, we will use the size standard for Television Broadcasting, which consists of all such companies having annual receipts of no more than $12.0 million;[99] 2) For Aural BAS, we will use the size standard for Radio Stations, which consists of all such companies having annual receipts of no more than $6 million;[100] 3) For Remote Pickup BAS we will use the small business size standard for Television Broadcasting when used by a TV station and that for Radio Stations when used by such a station.

According to Census Bureau data for 1997, there were 906 Television Broadcasting firms, total that operated for the entire year.[101] Of this total, 734 firms had annual receipts of $9,999,999.00 or less and an additional 71 had receipts of $10 million to $24,999,999.00.[102] Thus, under this standard, the majority of firms can be considered small.

According to Census Bureau data for 1997, there were 4,476 Radio Stations (firms), total, that operated for the entire year.[103] Of this total 4,265 had annual receipts of $4,999,999.00 or less, and an additional 103 firms had receipts of $5 million to $9,999,999.00.[104] Thus, under this standard, the great majority of firms can be considered small.

We believe, however, that most, if not all, of these auxiliary facilities could be classified as small businesses by themselves. We also recognize that most translators and boosters are owned by a parent station which, in some cases, would be covered by the revenue definition of small business entity discussed above. These stations would likely have annual revenues that exceed the SBA maximum to be designated as a small business (as noted, either $6 million for a radio station or $12 million for a TV station). Furthermore, they do not meet the Small Business Act's definition of a "small business concern" because they are not independently owned and operated.

Incumbent microwave services in the 10.7-11.7 GHz and 12.75-13.25 GHz bands include common carrier, private operational fixed, and BAS services. Presently there are approximately 22,015 common carrier fixed licensees and 61,670 private operational-fixed licensees and broadcast auxiliary radio licensees in the microwave services. The SBA has developed a small business size standard for Cellular and other Wireless Telecommunications, which consists of all such companies having 1,500 or fewer employees.[105] According to Census Bureau data for 1997, there were 977 firms in this category, total, that operated for the entire year.[106] Of this total, 965 firms had employment of 999 or fewer employees, and an additional 12 had employment of 1,000 employees or more.[107] Thus, under this standard, virtually all firms can be considered small.

[99] 13 C.F.R. § 121.201, NAICS code 515120.

[100] *Id*. at NAICS code 515111.

[101] U.S. Census Bureau, 1997 Economic Census, Subject Series: Information, "Receipts Size of Firms Subject to Federal Income Tax: 1997," Table 4, NAICS code 513120 (issued Oct. 2000).

[102] *Id.* The census data do not provide a more precise estimate.

[103] *Id.* At NAICS code 513112.

[104] *Id.* The census data do not provide a more precise estimate.

[105] 13 C.F.R. § 121.201, NAICS code 517212.

[106] U.S. Census Bureau, 1997 Economic Census, Subject Series: Information, "Employment Size of Firms Subject to Federal Income Tax: 1997," Table 5, NAICS code 513310 (issued Oct. 2000).

[107] *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is "Firms with 1,000 employees or more."

We estimate, for this purpose, that all of the Fixed Microwave licensees (excluding broadcast auxiliary licensees) would qualify as small entities under the SBA definition for radiotelephone companies.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

No modifications of the rules of the *First R&O* in this Second M&O impose new reporting, recordkeeping, or other compliance requirements.

E. Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

The RFA requires an agency to describe any significant alternatives that it has considered in developing its approach, which may include the following four alternatives (among others): "(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.[108]

The Commission has adopted technical Rules to facilitate spectrum sharing between new NGSO FSS systems in the Ku band and existing services in this spectrum. Wherein we grant in part Skybridge's requests for reconsideration, we modify these rules to further these goals. We acknowledge that as the radio spectrum is increasingly used, it becomes more difficult to accommodate all requests for access to the radio spectrum, however, this action applies existing frequency coordination procedures to NGSO FSS systems sharing spectrum with fixed services. However, frequency coordination should ensure that new operations of either service will protect existing operations and have access to spectrum if it is technically possible.

In considering the Skybridge's request for NGSO FSS access to the 13.15-13.2125 GHz band, we considered the impact on terrestrial operations granting such a request might have. Further we adopted rules that carefully weigh the complexity of sharing with mobile BAS/CARS operations could impose against the need for minimal measures to accommodate sharing in bands increasingly congested by co-primary satellite and terrestrial use.

Regarding sharing between NGSO FSS systems and broadcast auxiliary ("BAS") operations, the Report and Order stated that the Commission will adopt some form of geographic protection areas for terrestrial operations in those bands used by NGSO FSS gateway earth stations. These protection areas will be further defined in a future proceeding, but are intended to facilitate the growth of terrestrial operations, while not unnecessarily hindering the deployment of NGSO FSS systems. Further, to ensure BAS operations in all areas can continue to operate unencumbered by new NGSO FSS systems, this *Second M&O* reinforces efforts to minimize impacts on BAS/CARS entities by retaining the 4 channels at 13.15-13.2125 GHz for exclusive co-primary BAS/CARS use in 50 km areas around major TV markets and by requiring NGSO FSS operations observe power limits to ensure continued operations outside those select areas.

Report to Congress: The Commission will send a copy of the *Second M&O*, including this FRFA, in a report to be sent to Congress pursuant to the Small Business Regulatory Enforcement Fairness Act of 1996, *see* 5 U.S.C. § 801(a)(1)(A). In addition, the Commission will send a copy of the *Second M&O* including FRFA, to the Chief Counsel for Advocacy of the Small Business Administration. A copy of the *Second M&O* and FRFA (or summaries thereof) will also be published in the Federal Register. *See* 5 U.S.C. § 604(b).

[108] 5 U.S.C. § 603(c)(1) – (c)(4).